



Name _____ Date _____ Time _____

Three or more points on the same line are called **collinear points**.

Example: Points A , B , and C are collinear points on the line below. ABC means that A , B , and C are collinear points, and point B is between points A and C .



1. The following are true statements about \overline{EH} :
 EFH and FGH
 The following are false statements about \overline{EH} :
 FEH and FHG



- a. Name two more true statements about line \overleftrightarrow{EH} . _____

- b. Name two more false statements about line \overleftrightarrow{EH} . _____

2. Place collinear points J , K , L , M , N , and O on the line below using these clues:

- ◆ J and O are not between any points



- ◆ *MKL*
- ◆ *NLJ*
- ◆ *MKN*

3. Show a different solution to the puzzle in Problem 2.



4. Create a collinear-points puzzle on the back of this page. Be sure to give enough clues. Record your solution on the line below. Ask someone to solve your puzzle. Can the problem solver find more than one solution to your puzzle?



10

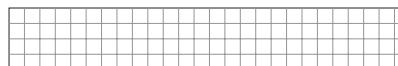
Name _____ Date _____ Time _____

STUDY LINK 1.3 Angles and Quadrangles



Use a straightedge to draw the geometric figures.

1. Draw 2 examples of a rectangle



2. Draw 2 examples of a trapezoid



3. How are the polygons in Problems 1 and 2 similar? How are they different?

4. a. Draw right angle DEF .

5. Draw an angle that is larger than a right angle. Label the vertex K .

- b. What is the vertex of the angle? Point _____
- c. What is another name for $\angle DEF$? \angle _____

Practice

6. $9 + 8 =$ _____ 7. $7 + 8 =$ _____ 8. $30 + 80 =$ _____
9. _____ $= 50 + 40$ 10. _____ $= 17 + 94$ 11. $158 + 93 =$ _____

11



Introduction to *Fourth Grade Everyday Mathematics*®

Welcome to *Fourth Grade Everyday Mathematics*. It is part of an elementary school mathematics curriculum developed by the University of Chicago School Mathematics Project (UCSMP).

Everyday Mathematics offers students a broad background in mathematics. Some approaches may differ from those you used as a student, but the approaches used are based on research, field test results, and the mathematics students will need in this century.

***Fourth Grade Everyday Mathematics* emphasizes the following content:**

Algebra and Uses of Variables Reading, writing, and solving number sentences

Algorithms and Procedures Exploring addition, subtraction, multiplication, and division methods; inventing individual procedures and algorithms; and experimenting with calculator procedures

Coordinate Systems and Other Reference Frames Using numbers in reference frames: number lines, coordinates, times, dates, and latitude and longitude

Exploring Data Collecting, organizing, displaying, and interpreting numerical data

Functions, Patterns, and Sequences Designing, exploring, and using geometric and number patterns

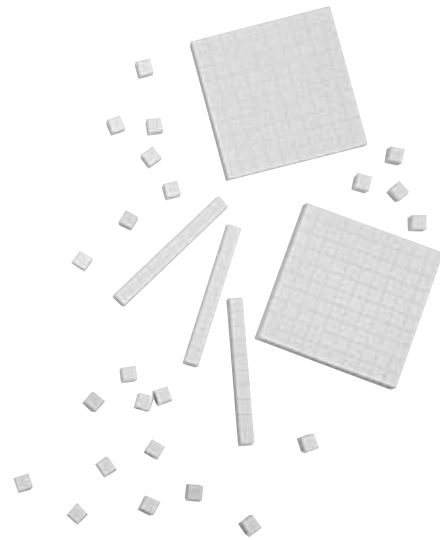
Geometry and Spatial Sense Developing an intuitive sense about 2- and 3-dimensional objects, their properties, uses, and relationships

Measures and Measurement Exploring metric and U.S. customary measures: linear, area, volume, weight; and exploring geographical measures

Numbers, Numeration, and Order Relations Reading, writing, and using whole numbers, fractions, decimals, percents, negative numbers; and exploring scientific notation

Operations, Number Facts, and Number Systems Practicing addition and subtraction to proficiency; and developing multiplication and division skills

Problem Solving and Mathematical Modeling Investigating methods for solving problems using mathematics in everyday situations



Naming and Constructing Geometric Figures

During the next few weeks, the class will study the geometry of 2-dimensional shapes. Students will examine definitions and properties of shapes and the relationships among them. Students will use compasses to construct shapes and to create their own geometric designs.

Please keep this Family Letter for reference as your child works through Unit 1.

Vocabulary

Important terms in Unit 1:

concave (nonconvex) polygon

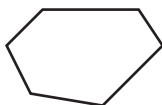
A polygon in which at least one vertex is “pushed in.”



concave polygon

convex polygon

A polygon in which all vertices are “pushed outward.”



convex polygon

endpoint A point at the end of a line segment or a ray.

line Informally, a straight path that extends infinitely in opposite directions.

line segment A straight path joining two points. The two points are called the endpoints of the segment.

parallelogram A quadrilateral that has two pairs of parallel sides. Opposite sides of a parallelogram have equal lengths. Opposite angles of a parallelogram have the same measure.

polygon A 2-dimensional figure that is made up of three or more line segments joined end to end to make one closed path. The line segments of a polygon may not cross.

quadrangle (quadrilateral) A polygon that has four sides and four angles.

ray A straight path that extends infinitely from a point called its endpoint.

rhombus A quadrilateral whose sides are all the same length. All rhombuses are parallelograms. Every square is a rhombus, but not all rhombuses are squares.

trapezoid In *Everyday Mathematics*, a quadrilateral that has exactly one pair of parallel sides.

vertex The point where the rays of an angle, the sides of a polygon, or the edges of a polyhedron meet.

Do-Anytime Activities

To work with your child on concepts taught in this unit, try these interesting and rewarding activities:

1. Help your child discover everyday uses of geometry as found in art, architecture, jewelry, toys, and so on.
2. See how many words your child can think of that have Greek/Latin prefixes such as *tri-*, *quad-*, *penta-*, *hexa-*, and *octa-*.
3. Help your child think of different ways to draw or make figures without the use of a compass, protractor, or straightedge. For example, you can trace the bottom of a can to make a circle, bend a straw to form a triangle, or make different shapes with toothpicks.
4. Challenge your child to draw or build something, such as a toothpick bridge, using triangular and square shapes. Or show pictures of bridges and point out the triangles used in bridges to provide support.

Building Skills through Games

In Unit 1, your child will play the following games.

Addition Top-It See *Student Reference Book*, page 263. This game provides practice with addition facts.

Polygon Pair-Up See *Student Reference Book*, page 258. This game provides practice identifying properties of polygons.

Sprouts See *Student Reference Book*, page 313. This game provides practice with simple vertex-edge graphs and developing game strategies.




Subtraction Top-It See *Student Reference Book*, pages 263 and 264. This is a variation of *Addition Top-It* and provides practice with subtraction facts.

Sz'kwa See *Student Reference Book*, page 310. This game provides practice with intersecting line segments and developing game strategies.

As You Help Your Child with Homework


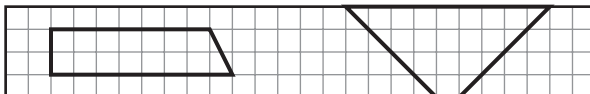
As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

Study Link 1•2

2. a. 
- b. 
- c. The line has arrows on both ends, but the line segment does not.
3. a. 
- b. No. A ray's endpoint must be listed first when naming a ray.
4. A ruler has markings on it, so it can be used to measure.

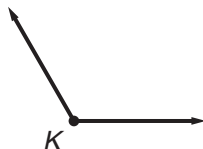
Study Link 1•3

Sample answers:

1. 
2. 

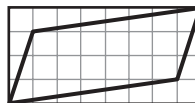
3. The polygons in Problems 1 and 2 have 4 sides and at least 1 pair of parallel sides. The Problem 1 polygons have 2 pairs of equal, parallel sides and all right angles.

4. a. 
- b. E
- c. FED

5. 

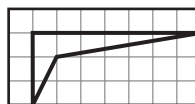
Study Link 1•4

1. Sample answer:

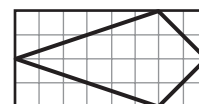


2. a. yes b. yes c. yes d. no

3. Sample answer:



4. kite



Study Link 1•5

1. rectangle 2. Equilateral triangle
3. rhombus

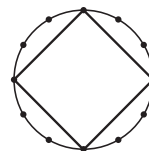
Study Link 1•6

1. A, B, C, E, F, G, I 2. B, C
3. C, E, F, I 4. A
5. A, B, D, F, G, H, I 6. D, G, H
7. 2

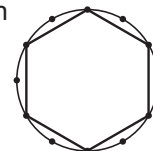
Study Link 1•8

1. Sample answers:

- a. square



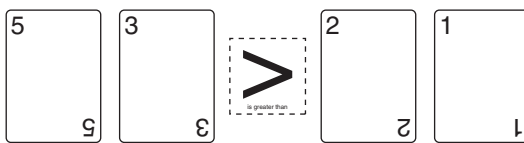
- c. hexagon



2. Sample answer: Sides are all the same length, and interior angles are all the same measure.

LESSON
1.1**Relation-Symbol *Top-It***

1. Cut out the relation symbol cards at the bottom of the page.
2. Shuffle 4 each of the number cards 0–9 and place the deck facedown on the table.
3. Each student turns over 2 cards and makes the largest 2-digit number possible.
4. Students take turns placing the correct relation symbol ($>$, $<$, or $=$) between the cards and reading the number sentence.

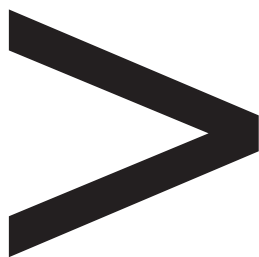
**Example:**

53 is greater than 21.

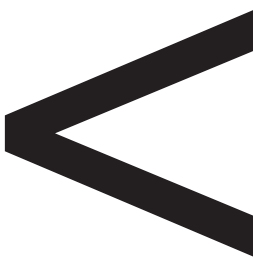
5. The student with the larger number takes the cards.
6. Play ends when not enough cards are left for each student to have another turn. The student with the most cards wins.
7. Record number sentences for several rounds of play.

53 > 21

_____	_____
_____	_____
_____	_____



is greater than



is less than

equals or is the
same as

LESSON

1.1

Symbols Scavenger Hunt



Mathematicians use symbols instead of writing out words such as *is greater than*, *is less than*, and *equals*. Search the *Student Reference Book* to find as many symbols as you can. Record the symbols and the words they stand for in the table below.

Symbol	Meaning
>	<i>is greater than</i>



LESSON

1.1

Symbols Scavenger Hunt



Mathematicians use symbols instead of writing out words such as *is greater than*, *is less than*, and *equals*. Search the *Student Reference Book* to find as many symbols as you can. Record the symbols and the words they stand for in the table below.

Symbol	Meaning
>	<i>is greater than</i>

STUDY LINK
1·2

Line Segments, Lines, and Rays



1. List at least 5 things in your home that remind you of line segments.



Use a straightedge to complete Problems 2 and 3.

2. a. Draw and label line AB .

- b. Draw and label line segment AB .

- c. Explain how your drawings of \overleftrightarrow{AB} and \overline{AB} are different.

3. a. Draw and label ray CD .

- b. Anita says \overrightarrow{CD} can also be called \overrightarrow{DC} . Do you agree? Explain.

4. Explain how a ruler is different from a straightedge.

Practice

5. $13 - 7 = \underline{\hspace{2cm}}$

6. $15 - 8 = \underline{\hspace{2cm}}$

7. $\underline{\hspace{2cm}} = 90 - 50$

8. $140 - 60 = \underline{\hspace{2cm}}$

9. $\underline{\hspace{2cm}} = 57 - 39$

10. $115 - 86 = \underline{\hspace{2cm}}$

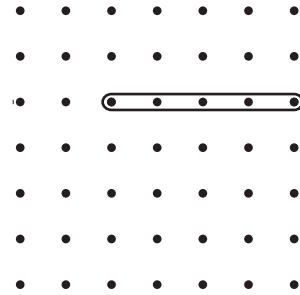
LESSON
1•2

Geoboard Line Segments



A **line segment** is made up of 2 points and the straight path between them. Rubber bands can be used to represent line segments on a geoboard.

Example:

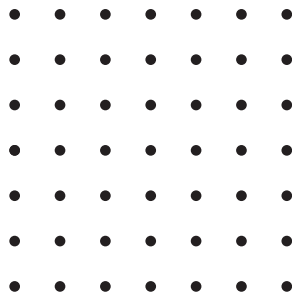


This line segment touches 5 pins.

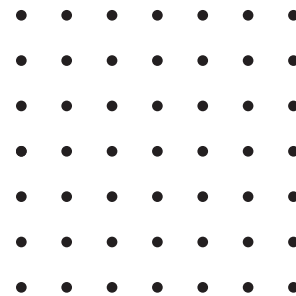
Practice making line segments, and then follow the directions below.

Record your work.

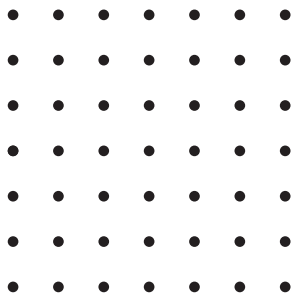
- 1.** Make a line segment that touches 4 pins.



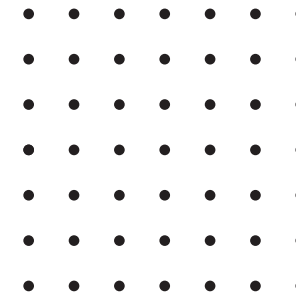
- 2.** Make a line segment that touches 4 different pins.



- 3.** Make the shortest line segment possible.



- 4.** Make the longest line segment possible.



- 5.** Cami says she cannot make a **line** on her geoboard. Do you agree? Explain why or why not. (*Hint: Look up **line** in the glossary of your *Student Reference Book*.*)

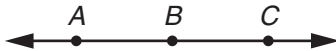
LESSON
1.2

Collinear-Points Puzzle



Three or more points on the same line are called **collinear points**.

Example: Points A , B , and C are collinear points on the line below. ABC means that A , B , and C are collinear points, and point B is between points A and C .



1. The following are true statements about \overleftrightarrow{EH} :
 EFH and FGH
 The following are false statements about \overleftrightarrow{EH} :
 FEH and FHG



a. Name two more true statements about line \overleftrightarrow{EH} . _____

b. Name two more false statements about line \overleftrightarrow{EH} . _____

2. Place collinear points J , K , L , M , N , and O on the line below using these clues:

◆ J and O are not between any points.



◆ MKL

◆ NLJ

◆ MKN

3. Show a different solution to the puzzle in Problem 2.



4. Create a collinear-points puzzle on the back of this page. Be sure to give enough clues. Record your solution on the line below. Ask someone to solve your puzzle. Can the problem solver find more than one solution to your puzzle?



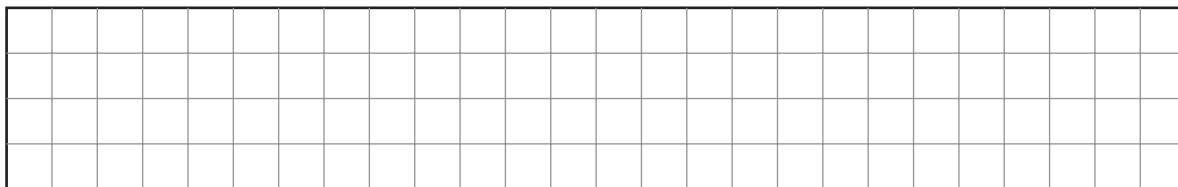
STUDY LINK
1•3

Angles and Quadrangles

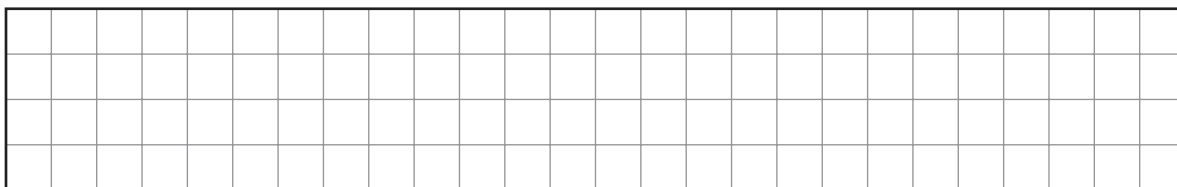


Use a straightedge to draw the geometric figures.

1. Draw 2 examples of a rectangle.



2. Draw 2 examples of a trapezoid.



3. How are the polygons in Problems 1 and 2 similar? How are they different?

4. a. Draw right angle DEF .

5. Draw an angle that is larger than a right angle. Label the vertex K .

b. What is the vertex of the angle? Point _____

c. What is another name for $\angle DEF$? \angle _____

Practice

6. $9 + 8 =$ _____

7. $7 + 8 =$ _____

8. $30 + 80 =$ _____

9. _____ $= 50 + 40$

10. _____ $= 17 + 94$

11. $158 + 93 =$ _____

LESSON
1•3

Pattern-Block Sort



Label one sheet of paper: **These fit the rule.**

Label another sheet of paper: **These do NOT fit the rule.**

Sort the pattern blocks (hexagon, trapezoid, square, triangle, 2 rhombuses) according to the rules given below. Then use the shapes marked “PB” on your Geometry Template to record the results of your sort.

<p>1. Exactly 4 sides</p> <table border="1"> <tr> <td data-bbox="66 642 386 1163">These fit the rule.</td> <td data-bbox="386 642 743 1163">These do NOT fit the rule.</td> </tr> </table>	These fit the rule.	These do NOT fit the rule.	<p>2. All sides the same length</p> <table border="1"> <tr> <td data-bbox="743 642 1071 1163">These fit the rule.</td> <td data-bbox="1071 642 1385 1163">These do NOT fit the rule.</td> </tr> </table>	These fit the rule.	These do NOT fit the rule.
These fit the rule.	These do NOT fit the rule.				
These fit the rule.	These do NOT fit the rule.				
<p>3. 4 sides <i>and</i> all sides the same length</p> <table border="1"> <tr> <td data-bbox="66 1320 386 1799">These fit the rule.</td> <td data-bbox="386 1320 743 1799">These do NOT fit the rule.</td> </tr> </table>	These fit the rule.	These do NOT fit the rule.	<p>4. All angles the same measure, <i>and</i> all sides the same length</p> <table border="1"> <tr> <td data-bbox="743 1320 1071 1799">These fit the rule.</td> <td data-bbox="1071 1320 1385 1799">These do NOT fit the rule.</td> </tr> </table>	These fit the rule.	These do NOT fit the rule.
These fit the rule.	These do NOT fit the rule.				
These fit the rule.	These do NOT fit the rule.				

5. Make up your own rule. Sort the pattern blocks according to your rule. Record your rule and the pattern blocks that fit your rule on the back of this page.

LESSON
1•3

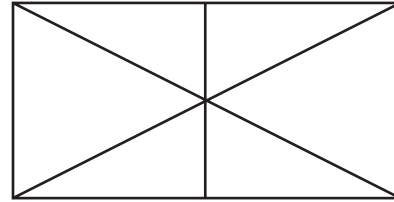
Polygon Search



1. Study the figure at the right.

- a. How many triangles do you see?

- b. How many triangles have a right angle?

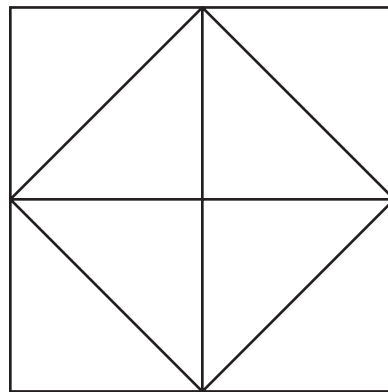


2. Study the figure at the right.

- a. How many squares do you see?

- b. How many triangles?

- c. How many rectangles that are *not* squares?

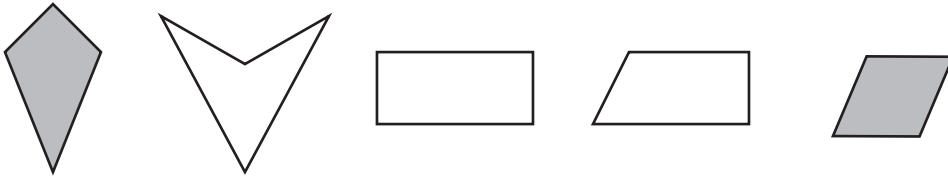


3. Make up a geometry puzzle like the one in Problem 2. Use a straightedge to draw line segments to connect some of the dots in the array. Write the answers on the back of this page. Then ask someone to count the number of different polygons in your puzzle.

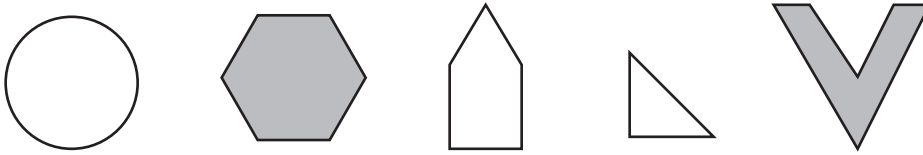


LESSON
1•4**Math Message: Properties of Polygons**

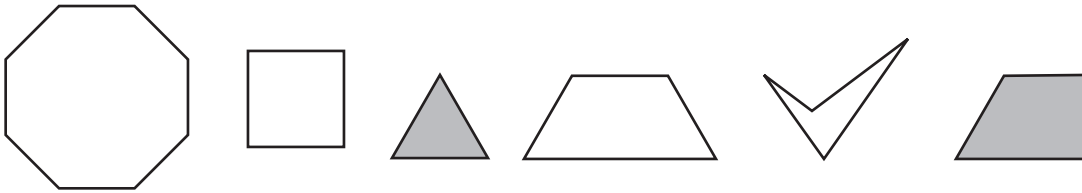
All of these have something in common.



None of these has it.



1. Which of these has it? Circle them.



2. What property do the circled polygons have in common? _____

3. Use your straightedge to draw a polygon that has this property.

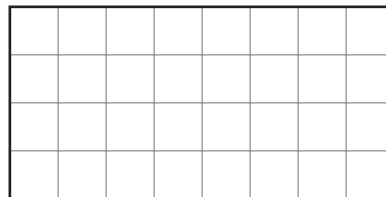
STUDY LINK
1•4

Classifying Quadrangles



- 1.** A parallelogram is a quadrangle (quadrilateral) that has 2 pairs of parallel sides.

Draw a parallelogram.



- 2.** Answer *yes* or *no*. Explain your answer.

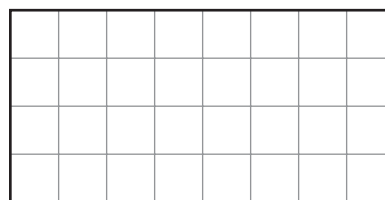
a. Is a rectangle a parallelogram? _____

b. Is a square a parallelogram? _____

c. Is a square a rhombus? _____

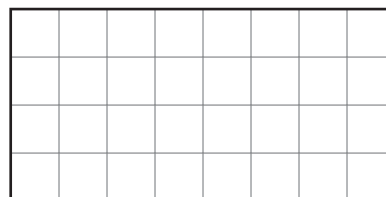
d. Is a trapezoid a parallelogram? _____

- 3.** Draw a quadrangle that has at least 1 right angle.



- 4.** Draw a quadrangle that has 2 pairs of equal sides but is NOT a parallelogram.

This is called a _____.


Practice

5. $12 - 6 =$ _____

6. $16 - 7 =$ _____

7. $210 - 150 =$ _____

8. _____ $= 140 - 80$

9. _____ $= 93 - 58$

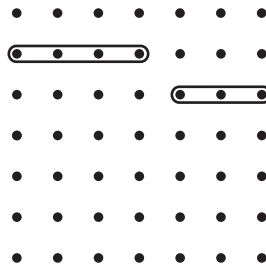
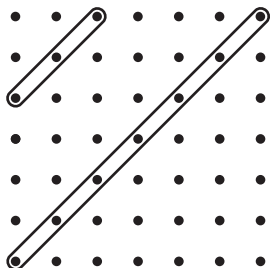
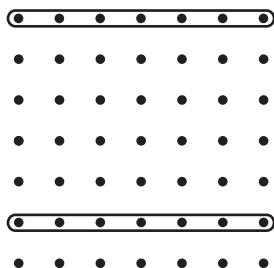
10. $123 - 76 =$ _____

LESSON
1•4

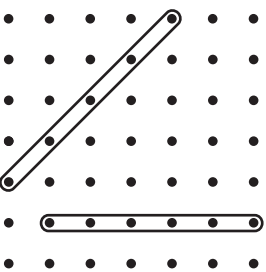
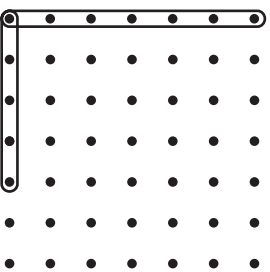
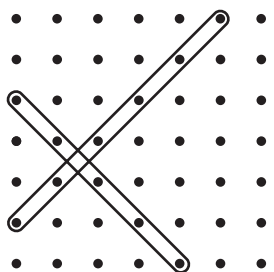
Parallel Line Segments



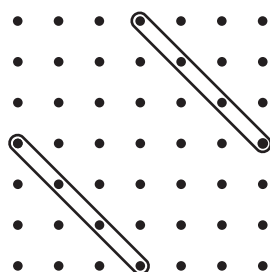
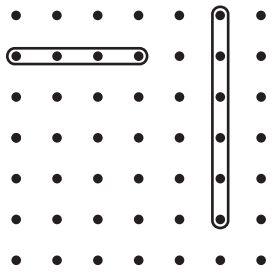
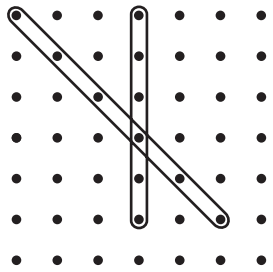
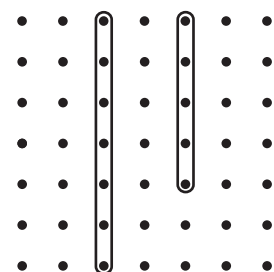
1. All of these are **parallel** line segments. Make each pair on your geoboard.



2. None of these are parallel line segments. Make each pair on your geoboard.



3. Some of these are parallel line segments. Make each pair on your geoboard.
Circle the parallel line segments.



4. How would you describe parallel line segments to a friend?

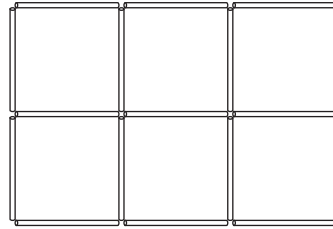
5. Practice making other parallel line segments on your geoboard.

LESSON
1•4

Straw-Squares Puzzle



1. Gather 17 straws of the same length.
Arrange them as shown to the right.



The arrangement of straws forms a rectangle. The object of this puzzle is to remove straws from the arrangement so that only 2 squares remain.

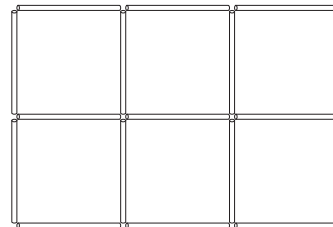
- ◆ You must remove *exactly* 6 straws from the arrangement.
 - ◆ You may not move any of the other straws.
2. Record your work on the picture above by marking an X on the straws you removed. Trace over the remaining straws that form the 2 squares.


LESSON
1•4

Straw-Squares Puzzle



1. Gather 17 straws of the same length.
Arrange them as shown to the right.



The arrangement of straws forms a rectangle. The object of this puzzle is to remove straws from the arrangement so that only 2 squares remain.

- ◆ You must remove *exactly* 6 straws from the arrangement.
 - ◆ You may not move any of the other straws.
2. Record your work on the picture above by marking an X on the straws you removed. Trace over the remaining straws that form the 2 squares.

STUDY LINK
1•5

Polygon Riddles



Answer each riddle. Then use a straightedge to draw a picture of the shape in the space to the right.

1. I am a quadrangle.

I have 2 pairs of parallel sides.

All of my angles are right angles.

I am not a square.

What am I? _____

2. I am a polygon.

All of my sides have the same measure.

All of my angles have the same measure.

I have 3 sides.

What am I? _____

3. I am a polygon.

I am a quadrangle.

All of my sides are the same length.

None of my angles are right angles.

What am I? _____

Try This

4. On the back of this page, make up your own polygon riddle using 4 clues. Make 2 of the clues hard and 2 of the clues easy. Check your riddle by using a straightedge to draw a picture of the polygon. Ask a friend or someone at home to solve your polygon riddle.

Practice

5. $8 + 9 =$ _____

6. $7 + 8 =$ _____

7. $90 + 70 =$ _____

8. _____ $= 60 + 50$

9. _____ $= 54 + 59$

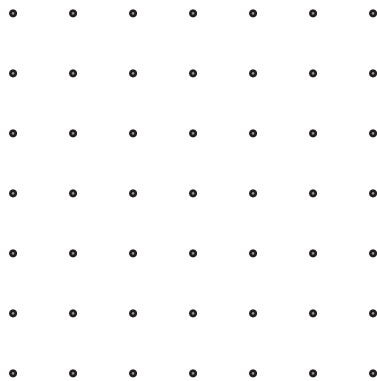
10. $185 + 366 =$ _____

LESSON
1•5**Polygons on a Geoboard**

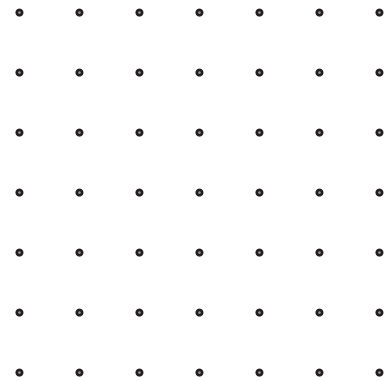
Practice using rubber bands to make polygons on a geoboard, then follow the directions below. Use a straightedge to record your work.



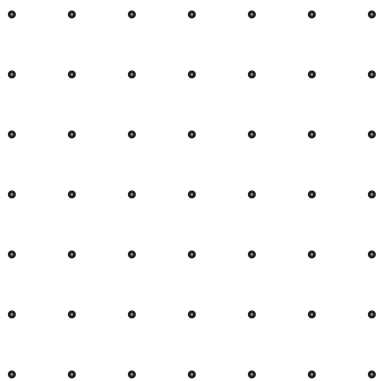
- 1.** Make a triangle in which each side touches at least 4 pins.



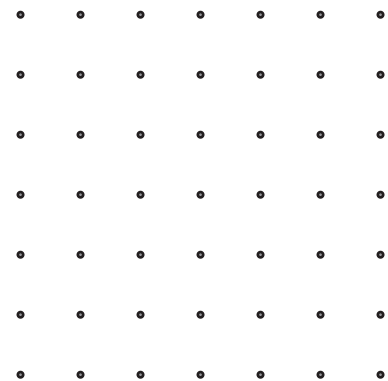
- 2.** Make a square in which each side touches at least 3 pins.



- 3.** Make a trapezoid.



- 4.** Make a hexagon that only touches 8 pins.



- 5.** Compare your polygons with those of a partner. In the space below, make a list of how the polygons are alike and how they are different.

LESSON

1•5

The Greedy Triangle



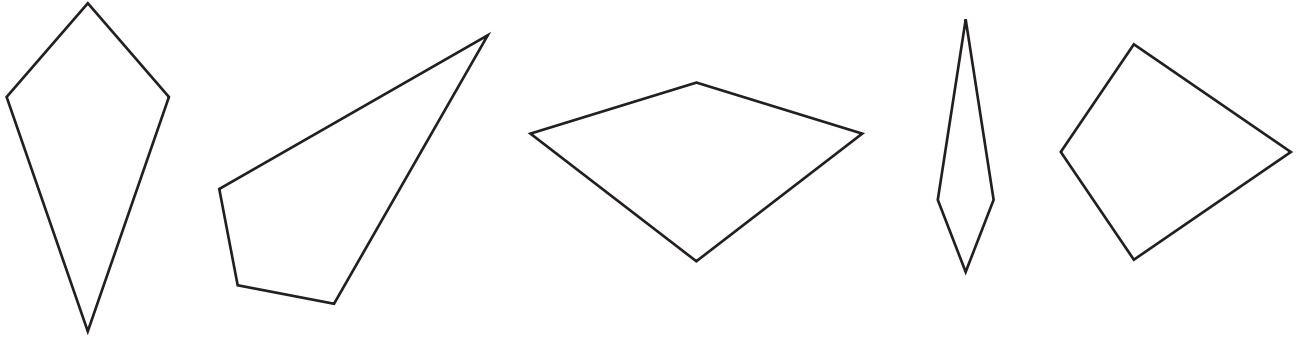
1. Make an equilateral triangle using your straws. Use a straightedge to draw the shape you made in the table below.
2. With the straws, continue adding one side and one angle to show all the changes that the triangle went through.
3. Complete the table below while making the shapes.



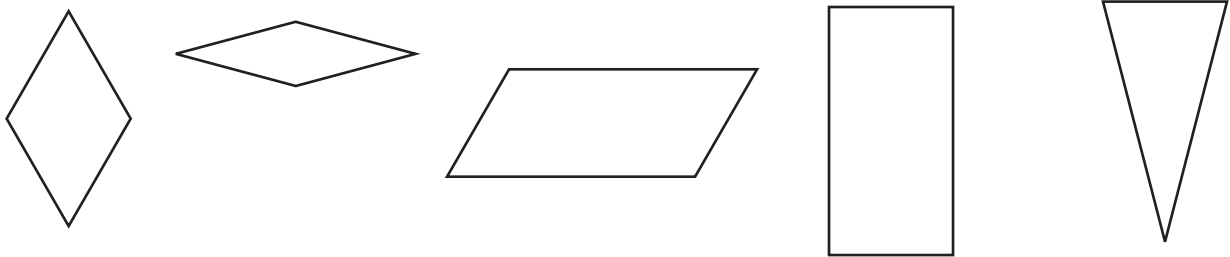
Shape	Drawing of Shape	Number of Sides	Number of Angles
equilateral triangle		3	3
quadrilateral		4	
pentagon		5	
hexagon		6	
heptagon		7	
octagon		8	
nonagon		9	
decagon		10	

LESSON
1.5**What Is a Kite?**

These are kites.



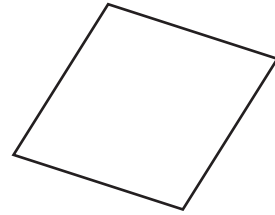
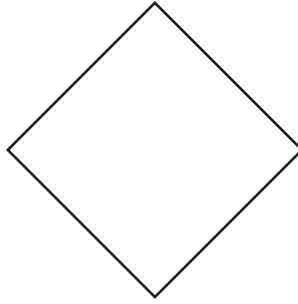
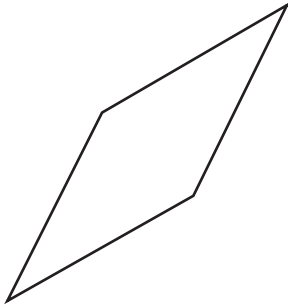
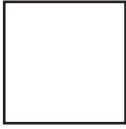
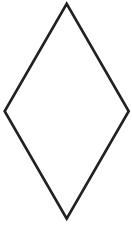
These are NOT kites.



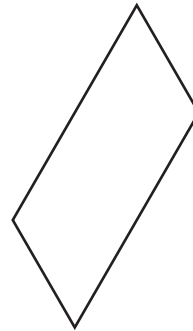
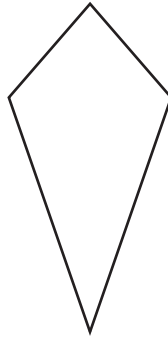
If you had to explain what a kite is, what would you say?

LESSON
1•5**What Is a Rhombus?**

These are rhombuses.



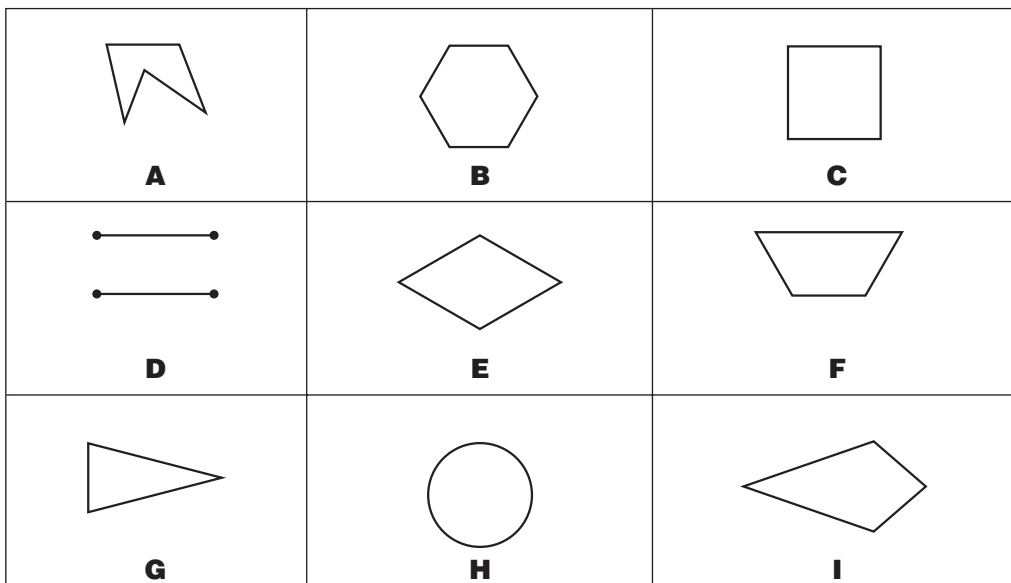
These are NOT rhombuses.



If you had to explain what a rhombus is, what would you say?

STUDY LINK
1•6

Properties of Geometric Figures



Write the letter or letters that match each statement.

- These are polygons. _____
- These are regular polygons. _____
- These are quadrangles. _____
- These are concave. _____
- These are NOT parallelograms. _____
- These do NOT have any right angles or angles whose measures are larger than a right angle. _____

Try This

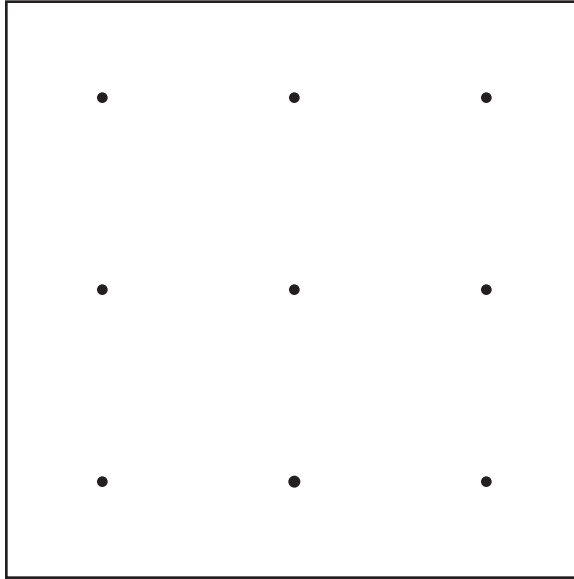
7. Take a paper clip and two pencils. Create a homemade compass. You may not bend or break the paper clip. How many different size circles can you make with it? _____

Practice

- | | | |
|-----------------------|------------------------|-------------------------|
| 8. $30 + 50 =$ _____ | 9. $40 + 60 =$ _____ | 10. $250 + 140 =$ _____ |
| 11. _____ $= 80 - 20$ | 12. _____ $= 120 - 70$ | 13. $460 - 230 =$ _____ |

LESSON
1•6**A Crowded-Points Puzzle**

Nine points are crowded together in a large, square room.
The points do not like crowds.



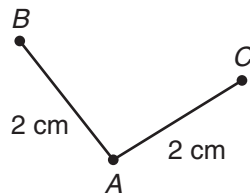
1. Use a straightedge to draw 2 squares so that each point will have a room of its own.
2. Explain what you did to solve this puzzle.
 - ◆ Describe the squares you drew using vocabulary words you learned in class.
 - ◆ Tell how you know that the 2 polygons you drew are squares.

LESSON
1•7**Math Message**

Name _____

Date _____

Point *B* is about 2 centimeters from point *A*. Point *C* is about 2 centimeters from point *A*.

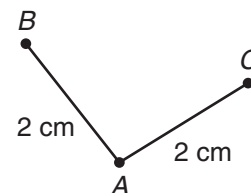


1. Draw 20 more points. Each must be about 2 centimeters from point *A*.
2. What did you draw? _____

Name _____

Date _____

Point *B* is about 2 centimeters from point *A*. Point *C* is about 2 centimeters from point *A*.

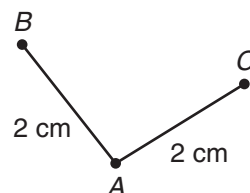


1. Draw 20 more points. Each must be about 2 centimeters from point *A*.
2. What did you draw? _____

Name _____

Date _____

Point *B* is about 2 centimeters from point *A*. Point *C* is about 2 centimeters from point *A*.

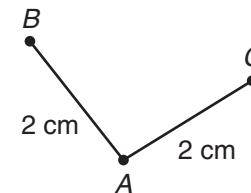


1. Draw 20 more points. Each must be about 2 centimeters from point *A*.
2. What did you draw? _____

Name _____

Date _____

Point *B* is about 2 centimeters from point *A*. Point *C* is about 2 centimeters from point *A*.



1. Draw 20 more points. Each must be about 2 centimeters from point *A*.
2. What did you draw? _____

STUDY LINK
1.7

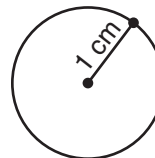
The Radius of a Circle



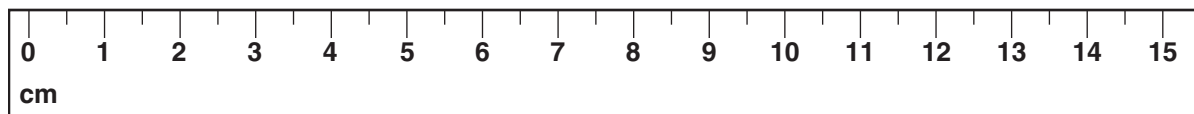
1. Find 3 circular objects. Trace around them to make 3 circles in the space below or on the back of this page. For each circle, do the following:

- Draw a point to mark the approximate center of the circle. Then draw a point on the circle.
- Use a straightedge to connect these points.
This line segment is a **radius** of the circle.
- Use a ruler to measure the radius to the nearest centimeter. If you do not have a ruler at home, cut out the one at the bottom of this page.
- Record the measure of the radius next to the circle.

Example:

**Practice**

- | | | |
|---------------------|---------------------|----------------------|
| 2. _____ = 80 + 20 | 3. _____ = 30 + 90 | 4. 580 + 370 = _____ |
| 5. 120 - 30 = _____ | 6. 160 - 70 = _____ | 7. 650 - 280 = _____ |



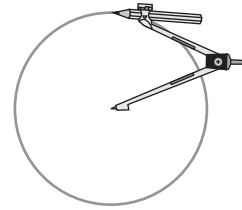
LESSON
1.7**Tangent Circles**

Two circles that “barely touch” (touch at just one point) are said to be **tangent** to each other.

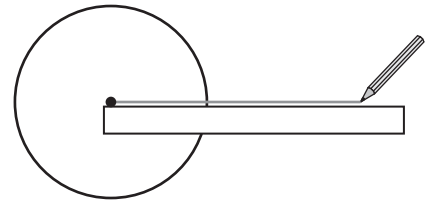
On a separate sheet of paper, draw two congruent circles that are tangent to each other. Then draw a third congruent circle that is tangent to each of the other two circles.

Here is one way.

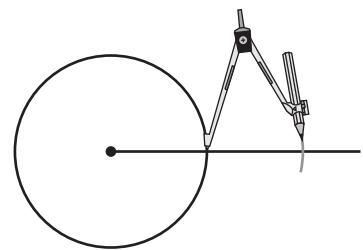
1. Draw a circle. Afterward, do not change the opening of the compass.



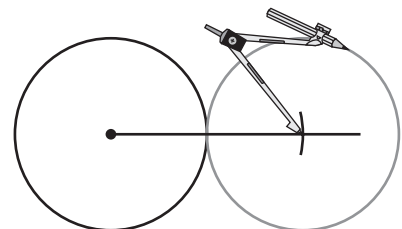
2. Use a straightedge to draw a line segment from the center of the circle. Make the segment at least twice as long as the radius of the circle.



3. On this segment, mark a point that is outside of the circle. Make the distance from the circle to the point equal to the radius of the circle. Use your compass.



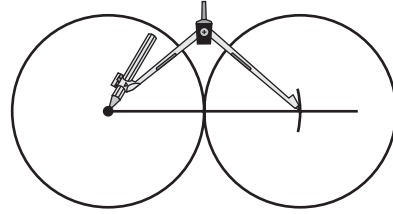
4. Draw a second circle, using the point you marked for the center of the circle.



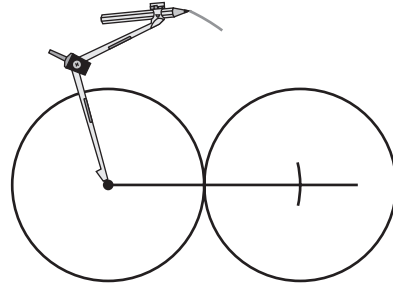
Directions continue on *Math Masters*, page 28.

LESSON
1.7**Tangent Circles** *continued*

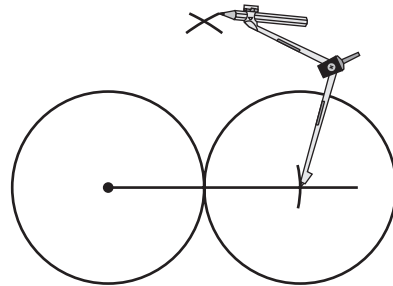
5. Open the compass so that the anchor is on the center of one circle and the pencil point is on the center of the other circle.



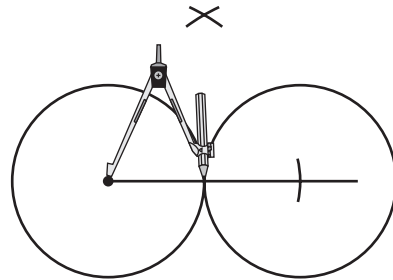
6. Swing the compass and make a mark (an arc) above the two circles.



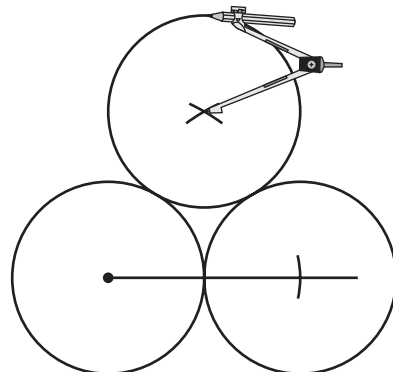
7. Move the anchor to the center of the other circle and make an arc through the first arc.



8. Close the compass to the original opening (the radius of the original circles).



9. Put the anchor on the point where the two arcs intersect. Draw a third circle.

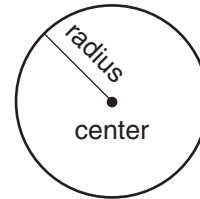


LESSON
1.7

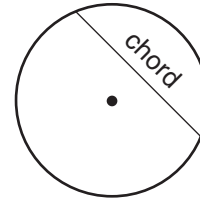
Radius, Chord, and Diameter



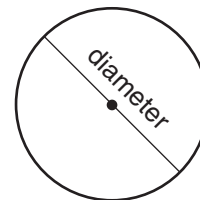
A **radius** is a line segment that connects the center of a circle with any point on the circle.



A **chord** is a line segment that connects 2 points on a circle.

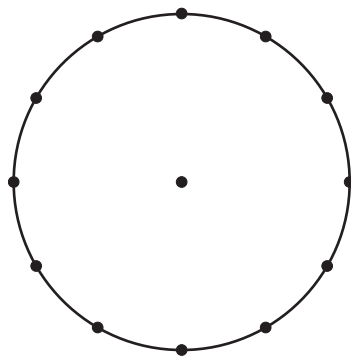


A **diameter** is a special chord. It is special because it is the chord with the largest possible length for that circle.

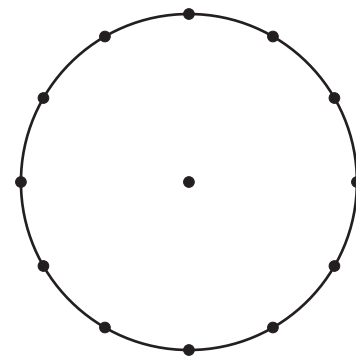


Use your straightedge to inscribe the polygons described in Problems 1–4.

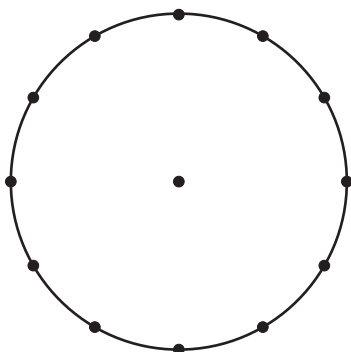
1. Draw 4 chords to make a rectangle.



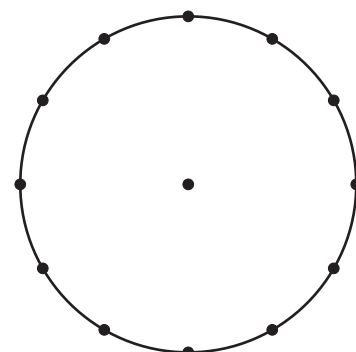
2. Draw a diameter and 3 chords to make a trapezoid.



3. Draw 3 chords to make an isosceles triangle.



4. Draw 4 chords to make a kite.



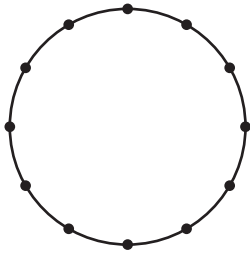
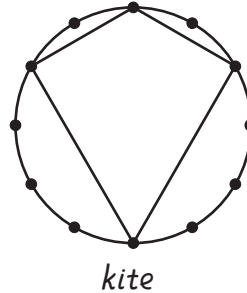
STUDY LINK
1•8

Inscribed Polygons

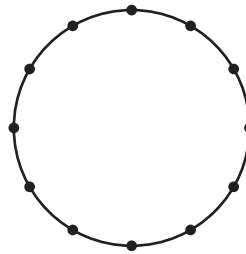


1. Use a straightedge to inscribe a different polygon in each of the circles below. Write the name of each polygon.

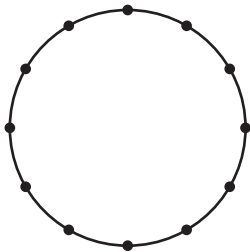
Example:



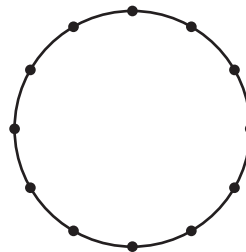
a. _____



b. _____



c. _____



d. _____

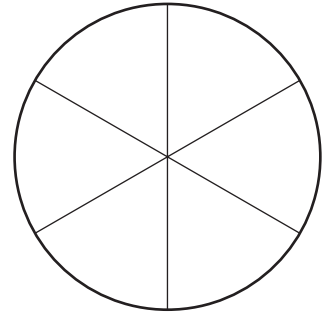
2. Are any of the polygons that you drew *regular polygons*? Explain how you know.

Practice

- | | | |
|----------------------|-----------------------|------------------------|
| 3. $41 + 27 =$ _____ | 4. _____ $= 263 + 59$ | 5. $461 + 398 =$ _____ |
| 6. _____ $= 72 - 36$ | 7. $158 - 71 =$ _____ | 8. $742 - 349 =$ _____ |

LESSON
1•8**A Hexagon Design**

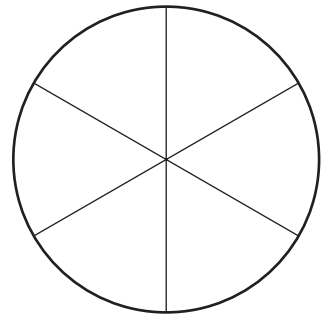
1. Outline the regular hexagon in the design to the right using a red crayon or pencil. Use your crayons or pencils to color the design in an interesting way.



2. How do you know the polygon you outlined is a regular hexagon? _____

**LESSON**
1•8**A Hexagon Design**

1. Outline the regular hexagon in the design to the right using a red crayon or pencil. Use your crayons or pencils to color the design in an interesting way.



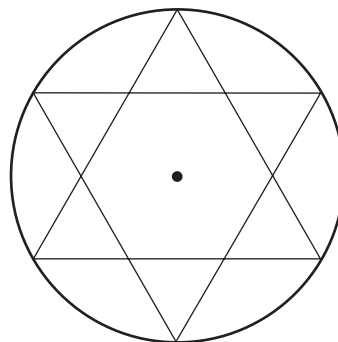
2. How do you know the polygon you outlined is a regular hexagon? _____

LESSON
1•8

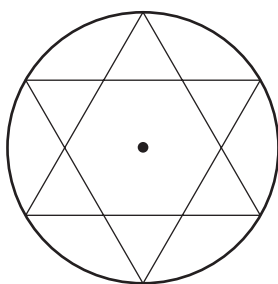
Creating 6-Point Designs



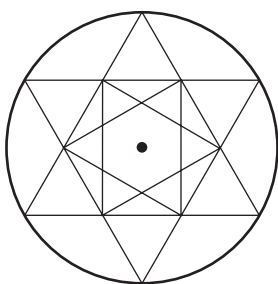
1. This 6-pointed star is called a **hexagram**. Use your compass and straightedge to construct a hexagram on a separate sheet of paper.



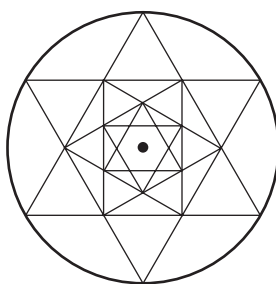
2. Construct another large hexagram on a separate sheet of paper. Draw a second hexagram inside the first, and then a third hexagram inside the second. Make a hexagram design by coloring your construction.



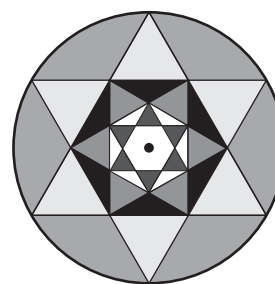
1



2

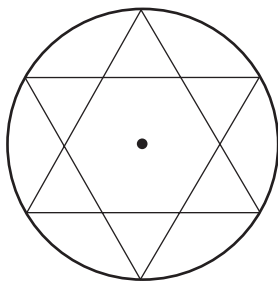


3

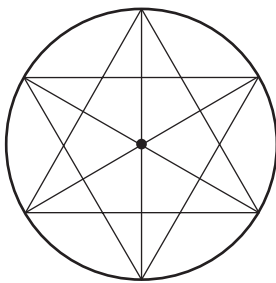


Sample design

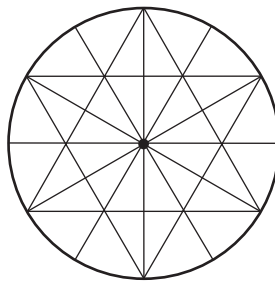
3. Construct the hexagram pattern several more times. Color each one in a different way to create a new design.
4. Construct the following pattern several times on separate sheets of paper. Color each one in a different way.



1



2



3

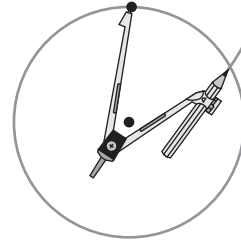
Try This

5. Create and color your own 6-point designs on separate sheets of paper.

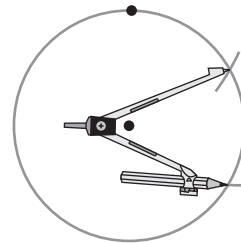
LESSON
1•8**An Inscribed Equilateral Triangle**

Follow each step below. Draw on a separate sheet of paper. Repeat these steps several times. Then cut out your best work and tape it to the bottom of this page.

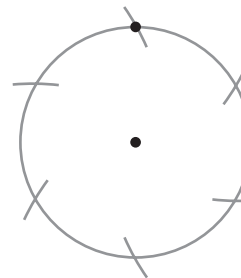
- Step 1** Draw a circle. (Keep the same compass opening for Steps 2 and 3.)
Draw a dot on the circle. Place the anchor of your compass on the dot and draw a mark on the circle.



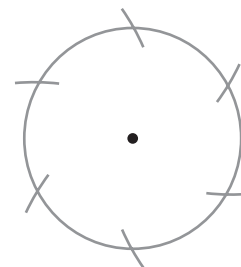
- Step 2** Place the anchor of your compass on the mark you just made and draw another mark on the circle.



- Step 3** Do this 4 more times to divide the circle into 6 equal parts. The 6th mark should be on the dot you started with or very close to it.



- Step 4** With your straightedge, connect 3 alternating marks (every other mark) on the circle to form an equilateral triangle. Use your compass to check that the sides of the equilateral triangle are about the same length.



Unit 2: Family Letter



Using Numbers and Organizing Data

Your child is about to begin this year's work with numbers. The class will examine what numbers mean and how they are used in everyday life.

In today's world, numbers are all around us—in newspapers and magazines and on TV. We use them

- ◆ to count things (*How many people are in the room?*)
- ◆ to measure things (*How tall are you?*)
- ◆ to create codes (*What is your Social Security number?*)
- ◆ to locate things in reference frames (*What time is it?*)
- ◆ to express rates, scales, and percents (*How many miles per gallon does your car get? What percent voted for Jamie?*)

Sometimes students will need to interpret a collection of numbers. The class will learn to organize such collections of numbers in tables and graphs and to draw conclusions about them.

Computation is an important part of problem solving. Fortunately, we are no longer restricted to paper-and-pencil methods of computation. We can use calculators or computer programs to solve lengthy or complex problems. Your child will practice mental and paper-and-pencil methods of computation, use a calculator, and have opportunities to decide which is most appropriate for solving a particular problem.

Many of us were taught that there is just one way to do computations. For example, we may have learned to subtract by "borrowing." We may not have realized that there are other ways of subtracting numbers. While students will not be expected to learn more than one method, they will examine several different methods and realize that there are often several ways to arrive at the same result. They will have the option of using the methods with which they are comfortable or even inventing one of their own.

Mathematics games will be used throughout the school year to practice various arithmetic skills. Through games, practice becomes a thinking activity to be enjoyed. The games your child will play in this unit will provide practice with renaming numbers, with addition, and with subtraction. They require very little in the way of materials, so you may play them at home as well.

Please keep this Family Letter for reference as your child works through Unit 2.

Vocabulary

Important terms in Unit 2:

algorithm A set of step-by-step instructions for doing something, such as carrying out a computation or solving a problem.

base 10 Our number system in which each place in a number has a value 10 times the place to its right and $\frac{1}{10}$ the place to its left.

column-addition A method for adding numbers in which the addends' digits are first added in each place-value column separately, and then 10-for-1 trades are made until each column has only one digit. Lines are drawn to separate the place-value columns.

	100s	10s	1s
	2	4	8
+	1	8	7

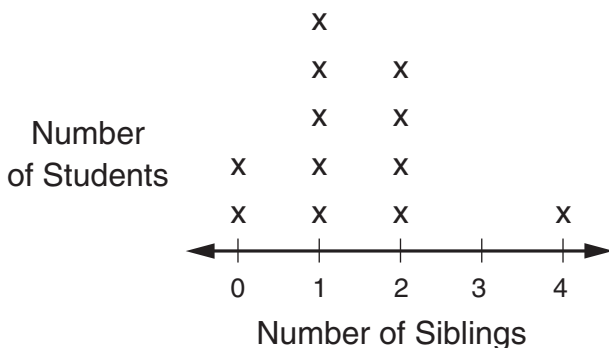
Add the columns: 3 12 15

Adjust the 1s and 10s: 3 13 5

Adjust the 10s and 100s: 4 3 5

equivalent names Different names for the same number. For example, $2 + 6$, $4 + 4$, $12 - 4$, $18 - 10$, $100 - 92$, $5 + 1 + 2$, eight, VIII, and HHH III are equivalent names for 8.

line plot A sketch of data in which check marks, Xs, or other marks above a labeled line show the frequency of each value.



mean The sum of a set of numbers divided by the number of numbers in the set. The mean is often referred to simply as the "average."

median The middle value in a set of data when the data are listed in order from least to greatest. If there is an even number of data points, the median is the *mean* of the two middle values.

mode The value or values that occur most often in a set of data.

name-collection box A diagram that is used for writing *equivalent names* for a number. The box to the right shows names for 8.

8
$2 + 6$
$4 + 4$
VIII
eight

partial-differences subtraction A way to subtract in which differences are computed separately for each place (ones, tens, hundreds, and so on). The partial differences are then added to give the final answer.

$$\begin{array}{r}
 932 \\
 - 356 \\
 \hline
 \end{array}$$

Subtract the hundreds: $900 - 300 \rightarrow 600$
 Subtract the tens: $30 - 50 \rightarrow -20$
 Subtract the ones: $2 - 6 \rightarrow -4$
 Find the total: $600 - 20 - 4 \rightarrow 576$

partial-sums addition A way to add in which sums are computed for each place (ones, tens, hundreds, and so on) separately. The partial sums are then added to give the final answer.

$$\begin{array}{r}
 496 \\
 229 \\
 + 347 \\
 \hline
 \end{array}$$

Add the hundreds: $400 + 200 + 300 \rightarrow 900$
 Add the tens: $90 + 20 + 40 \rightarrow 150$
 Add the ones: $6 + 9 + 7 \rightarrow 22$
 Find the total: $900 + 150 + 22 \rightarrow 1,072$

range The difference between the maximum and the minimum in a set of data.

trade-first subtraction A subtraction method in which all trades are done before any subtractions are carried out.

whole numbers The numbers 0, 1, 2, 3, 4, and so on.

Do-Anytime Activities

To work with your child on the concepts taught in this unit, try these interesting and rewarding activities:

1. Have your child see how many numbers he or she can identify in newspapers, magazines, advertisements, or news broadcasts.
2. Have your child collect and compare the measurements (height and weight) or accomplishments of favorite professional athletes.
3. Look up the different time zones of the United States and the world, quizzing your child on what time it would be at that moment at a particular location.
4. Have your child look for different representations of the same number. For example, he or she may see the same money amounts expressed in different ways, such as 50¢, \$0.50, or 50 cents.

Building Skills through Games

In Unit 2, your child will play the following games. For detailed instructions, see the *Student Reference Book*.

Addition Top-It See *Student Reference Book*, page 263. This game provides practice with addition facts.

Fishing for Digits See *Student Reference Book*, page 242. This game provides practice identifying digits and the values of the digits, and adding and subtracting.

High-Number Toss See *Student Reference Book*, page 252. This game provides practice reading, writing, and comparing numbers.

Name That Number See *Student Reference Book*, page 254. This game reinforces skills in using all four operations.

Polygon Pair-Up See *Student Reference Book*, page 258. This game provides practice identifying properties of polygons.

Subtraction Target Practice See *Student Reference Book*, page 262. This game provides practice with subtraction and estimation.

Subtraction Top-It See *Student Reference Book*, pages 263 and 264. This is a variation of *Addition Top-It* and provides practice with subtraction facts.

As You Help Your Child with Homework

As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

Study Link 2•2

- Sample answers: 8×8 ; 32×2 ; $10 + 54$
- Sample answers: 2×66 ; 11×12 ; $66 + 66$;
 $30 + 30 + 30 + 30 + 12$;
 $(50 \times 2) + 32$
- Sample answers: $20 + 20$; $80 \div 2$; $\frac{1}{2} \times 80$
- Sample answers: 9×4 ; $72 \div 2$; $(12 \times 4) - 12$

Study Link 2•3

- 876,504,000 2. 23,170,080
- 876,504,000
- a. thousand; 400,000
b. million; 80,000,000
c. million; 500,000,000
d. thousand; 30,000

- b. 596,708 d. 1,045,620
- b. 13,877,000 d. 150,691,688

Study Link 2•4

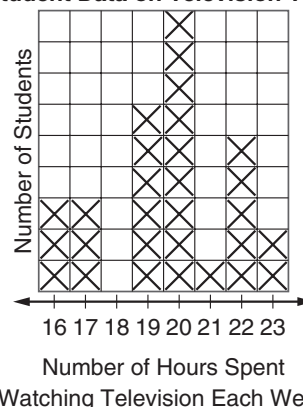
- 581,970,000 3. 97,654,320
- a. 487,000,063 b. 15,000,297
- 97,308,080

Study Link 2•5

- 27 3. 8 4. 2 5. 6 6. 5

Study Link 2•6

1. Student Data on Television Time



- a. 23 b. 16 c. 7 d. 20 e. 20
- 19.7

Study Link 2•7

- 152 2. 510 3. 613
- 1,432 5. 2,520 6. 5,747
- 136 12. 720 13. 225
- 720 15. 1,573 16. 2,356

Study Link 2•8

- a. 645 b. 19 c. 626 d. 151
- Giraffe, Asian elephant, and rhinoceros
- 90 4. dog 5. mouse

Study Link 2•9

- 68 11. 29
- 382 12. 57
- 367 13. 406
- 3,746 14. 224
- 2,889 15. 4,479
- 2,322 16. 2,538